09/919,372

L Number	Hits	Search Text	DB	Time stamp
1	4355444	clock distribution circuit	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:14
2	2303156	phase detector$1	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:15
3	453025	(clock distribution circuit) with (phase detector$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:19
4	1643180	generat$3 and (clock signal$1 with error signal$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:21
5	233141	((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:25
6	4682306	loop filter circuit	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:26
7	224627	(((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:30
8	1221430	pulse generator$1 and (pulse signal$1 with clock signal$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:33
9	152267	((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:40

| 10 | 622 | "6066969"
"6088255"
"4816700"
"5870595"
"6041073"
"4475085"
"5212410"
"5630102"
"5920222"
"5952857"
"6239647"
"4415984"
"4479216"
RE31828
"4613828"
"4801819"
"4905006"
"5210546"
"5257294"
"5359232"
"5459762"
"5600839"
"5612980"
"5621705"
"5628019"
"5633879"
"5646672"
"5724360"
"5774321"
"5787261"
"5805603"
"5901116"
"6052004"
"6058152"
"6078225"
"6094076"
"6160542"
"4361897"
"4375088"
"4376268"
"4399412"
"4454607"
"4499459"
"4512028"
"4527075"
"4542347"
"4547667"
"4557606"
"4580047"
"4580046" | USPAT;
US-PGPUB;
EPO; JPO;
DERWENT;
IBM_TDB | 2004/03/18 17:42 |

| 11 | 337 | (((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and ("6066969" "6088255" "4816700" "5870595" "6041073" "4475085" "5212410" "5630102" "5920222" "5952857" "6239647" "4415984" "4479216" RE31828 "4613828" "4801819" "4905006" "5210546" "5257294" "5359232" "5459762" "5600839" "5612980" "5621705" "5628019" "5633879" "5646672" "5724360" "5774321" "5787261" "5805603" "5901116" "6052004" "6058152" "6078225" "6094076" "6160542" "4361897" "4375088" "4376268" "4399412" "4454607" "4499459" "4512028" "4527075" "4542347" "4547667" "4557606" "4580047" "4580046") | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:42 |
| 12 | 70917 | summing and (error signal$1 with composite error signal$1) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:43 |

| 13 | 24 | ((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and ("6066969" "6088255" "4816700" "5870595" "6041073" "4475085" "5212410" "5630102" "5920222" "5952857" "6239647" "4415984" "4479216" RE31828 "4613828" "4801819" "4905006" "5210546" "5257294" "5359232" "5459762" "5600839" "5612980" "5621705" "5628019" "5633879" "5646672" "5724360" "5774321" "5787261" "5805603" "5901116" "6052004" "6058152" "6078225" "6094076" "6160542" "4361897" "4375088" "4376268" "4399412" "4454607" "4499459" "4512028" "4527075" "4542347" "4547667" "4557606" "4580047" "4580046")) and (summing and (error signal$1 with composite error signal$1)) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:43 |
| 14 | 3492556 | arbiter circuit$1 | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:43 |

| 15 | 24 | ((((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and ("6066969" "6088255" "4816700" "5870595" "6041073" "4475085" "5212410" "5630102" "5920222" "5952857" "6239647" "4415984" "4479216" RE31828 "4613828" "4801819" "4905006" "5210546" "5257294" "5359232" "5459762" "5600839" "5612980" "5621705" "5628019" "5633879" "5646672" "5724360" "5774321" "5787261" "5805603" "5901116" "6052004" "6058152" "6078225" "6094076" "6160542" "4361897" "4375088" "4376268" "4399412" "4454607" "4499459" "4512028" "4527075" "4542347" "4547667" "4557606" "4580047" "4580046")) and (summing and (error signal$1 with composite error signal$1))) and (arbiter circuit$1) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:44 |
| 16 | 968045 | synchronize local clock | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:44 |

| 17 | 23 | (((((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and (
 "6066969"
 "6088255"
 "4816700"
 "5870595"
 "6041073"
 "4475085"
 "5212410"
 "5630102"
 "5920222"
 "5952857"
 "6239647"
 "4415984"
 "4479216"
 RE31828
 "4613828"
 "4801819"
 "4905006"
 "5210546"
 "5257294"
 "5359232"
 "5459762"
 "5600839"
 "5612980"
 "5621705"
 "5628019"
 "5633879"
 "5646672"
 "5724360"
 "5774321"
 "5787261"
 "5805603"
 "5901116"
 "6052004"
 "6058152"
 "6078225"
 "6094076"
 "6160542"
 "4361897"
 "4375088"
 "4376268"
 "4399412"
 "4454607"
 "4499459"
 "4512028"
 "4527075"
 "4542347"
 "4547667"
 "4557606"
 "4580047"
 "4580046"
 )) and (summing and (error signal$1 with composite error signal$1))) and (arbiter circuit$1)) and (synchronize local clock) | USPAT;
 US-PGPUB;
 EPO; JPO;
 DERWENT;
 IBM_TDB | 2004/03/18 17:45 |
| 18 | 225249 | synchroniz$3 and (phase$1 with clock signal$1) | USPAT;
 US-PGPUB;
 EPO; JPO;
 DERWENT;
 IBM_TDB | 2004/03/18 17:45 |

| 19 | 15 | (((((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and (
"6066969"
"6088255"
"4816700"
"5870595"
"6041073"
"4475085"
"5212410"
"5630102"
"5920222"
"5952857"
"6239647"
"4415984"
"4479216"
RE31828
"4613828"
"4801819"
"4905006"
"5210546"
"5257294"
"5359232"
"5459762"
"5600839"
"5612980"
"5621705"
"5628019"
"5633879"
"5646672"
"5724360"
"5774321"
"5787261"
"5805603"
"5901116"
"6052004"
"6058152"
"6078225"
"6094076"
"6160542"
"4361897"
"4375088"
"4376268"
"4399412"
"4454607"
"4499459"
"4512028"
"4527075"
"4542347"
"4547667"
"4557606"
"4580047"
"4580046"
)) and (summing and (error signal$1 with composite error signal$1))) and (arbiter circuit$1)) and (synchronize local clock)) and (synchroniz$3 and (phase$1 with clock signal$1)) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:45 |
| 20 | 3861079 | integrated circuit | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:45 |

| 21 | 15 | (((((((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and ("6066969" "6088255" "4816700" "5870595" "6041073" "4475085" "5212410" "5630102" "5920222" "5952857" "6239647" "4415984" "4479216" RE31828 "4613828" "4801819" "4905006" "5210546" "5257294" "5359232" "5459762" "5600839" "5612980" "5621705" "5628019" "5633879" "5646672" "5724360" "5774321" "5787261" "5805603" "5901116" "6052004" "6058152" "6078225" "6094076" "6160542" "4361897" "4375088" "4376268" "4399412" "4454607" "4499459" "4512028" "4527075" "4542347" "4547667" "4557606" "4580047" "4580046")) and (summing and (error signal$1 with composite error signal$1))) and (arbiter circuit$1)) and (synchronize local clock)) and (synchroniz$3 and (phase$1 with clock signal$1))) and (integrated circuit) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:46 |
| 22 | 3736085 | synchroniz$3 with clock signal$1 | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:46 |

| 23 | 15 | (((((((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and (
"6066969"
"6088255"
"4816700"
"5870595"
"6041073"
"4475085"
"5212410"
"5630102"
"5920222"
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"6239647"
"4415984"
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RE31828
"4613828"
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"4905006"
"5210546"
"5257294"
"5359232"
"5459762"
"5600839"
"5612980"
"5621705"
"5628019"
"5633879"
"5646672"
"5724360"
"5774321"
"5787261"
"5805603"
"5901116"
"6052004"
"6058152"
"6078225"
"6094076"
"6160542"
"4361897"
"4375088"
"4376268"
"4399412"
"4454607"
"4499459"
"4512028"
"4527075"
"4542347"
"4547667"
"4557606"
"4580047"
"4580046"
)) and (summing and (error signal$1 with composite error signal$1))) and (arbiter circuit$1)) and (synchronize local clock)) and (synchroniz$3 and (phase$1 with clock signal$1))) and (integrated circuit)) and (synchroniz$3 with clock signal$1) | USPAT;
US-PGPUB;
EPO; JPO;
DERWENT;
IBM_TDB | 2004/03/18 17:46 |
| 24 | 72849 | jitter$1 or skew | USPAT;
US-PGPUB;
EPO; JPO;
DERWENT;
IBM_TDB | 2004/03/18 17:47 |

| 25 | 6 | (((((((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and (
"6066969"
"6088255"
"4816700"
"5870595"
"6041073"
"4475085"
"5212410"
"5630102"
"5920222"
"5952857"
"6239647"
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"5257294"
"5359232"
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"5600839"
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"5787261"
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"4454607"
"4499459"
"4512028"
"4527075"
"4542347"
"4547667"
"4557606"
"4580047"
"4580046"
)) and (summing and (error signal$1 with composite error signal$1))) and (arbiter circuit$1)) and (synchronize local clock)) and (synchroniz$3 and (phase$1 with clock signal$1))) and (integrated circuit)) and (synchroniz$3 with clock signal$1)) and (jitter$1 or skew) | USPAT;
US-PGPUB;
EPO; JPO;
DERWENT;
IBM_TDB | 2004/03/18 17:47 |
| 26 | 2391 | 714/700.ccls. or 714/707.ccls. or 714/738.ccls. or 714/798.ccls. or 714/799.ccls. or 714/814.ccls. or 714/812.ccls. | USPAT;
US-PGPUB;
EPO; JPO;
DERWENT;
IBM_TDB | 2004/03/18 17:50 |

(54) DUTY CYCLE CORRECTION CIRCUIT AND
APPARATUS AND METHOD EMPLOYING
SAME

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Payne, Plano, TX (US); Huanzhang
Huang, Dallas, TX (US); Douglas
Wente, Plano, TX (US)

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(57) **ABSTRACT**

The duty cycle for a periodic signal such as a clock signal
is idealized by feeding back duty cycle information. Duty
cycle information is detected by a capacitor connected in
serial with a resistor across the outputs of a feedback
differential transistor pair. Over time, the capacitor will be
charged or discharged when the duty cycle varies from fifty
percent. The detected duty cycle information is fed back to
an amplifier where the incoming clock signal is mixed with
the feedback signal. The amplifier itself comprises a first
differential comparator stage receiving the uncorrected
clock signal, a gain stage that amplifies and level shifts the
feedback signal, and a second differential pair receiving the
amplified feedback signal.